

PATENT COOPERATION TREATY

From the [Handwritten] AK SP IPER 29 Months: 02/19/06
INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY

To:

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PCT

NOTIFICATION OF TRANSMITTAL OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(PCT Rule 71.1)

Date of mailing

(day/month/year)

29 November 2005

Applicant's or Attorney's file reference

PG 06166WO

IMPORTANT NOTIFICATION

International Application No.

PCT/EP2004/010521

International Filing Date (day/month/year)

20 September 2004

Priority Date (day/month/year)

19 September 2003

Applicant

VOITH TURBO GMBH & CO. KG et al.

1. The Applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the selected Offices.
3. Where required by any of the selected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to this Office.
4. **REMINDER**

The Applicant must enter the national phase with each selected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/1B/301).

Where a translation of the international application must be furnished to a selected Office, this translation must contain a translation of all annexes to the international preliminary report on patentability. It is the Applicant's responsibility to prepare and furnish such translations directly to each selected Office concerned.

For further details on the applicable time limits and requirements of the selected Offices, see Volume II of the *PCT Applicant's Guide*.

The Applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step, and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State (...) may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed invention is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity, and support for the claims.

Name and mailing address of the International Patent
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(Chapter II of the Patent Cooperation Treaty)

Form PCT/IPEA/409 (cover sheet) (January 2004)

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY**

International Application No.
PCT/EP2004/010521

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This report is based on the translation from the original language into the following language, which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3 and 23.1 (b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets that have been furnished to the Receiving Office in response to a request under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

1-26 as originally filed

Claims, No.

1-16 received on 07/20/2005 with letter of 07/18./2005

Drawings, Sheets

1/11-11/11 as originally filed

- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:
 - ☐ Description, pages:
 - ☐ Claims, Nos.:
 - ☐ Drawings, sheets/figs:
 - ☐ Sequence listing (*specify*):
 - ☐ Any table(s) related to the sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure filed for the reasons given in the opinion of the Authority, as indicated in the Supplemental Box (Rule 70.2 (c)).
 - ☐ Description, pages:
 - ☐ Claims, Nos.:
 - ☐ Drawings, sheets/figs:
 - ☐ Sequence listing (*specify*):
 - ☐ Any table(s) related to the sequence listing (*specify*):

* If item 4 applies, some or all of those sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY**

International Application No.
PCT/EP2004/010521

Box No. V Statement with grounds under Article 35 (2) with regard to novelty, inventive step, and industrial applicability; documents and explanations supporting such statement

- | | | |
|-------------------------------|------|--------------|
| 1. Determination | | |
| Novelty (N) | Yes: | Claims 1-16 |
| | No: | Claims |
| Inventive step (IS) | Yes: | Claims 1-16 |
| | No: | Claims |
| Industrial applicability (IA) | Yes: | Claims: 1-16 |
| | No: | Claims: |

2. Documents and explanations (Rule 70.7):

See Annex

Regarding Point V

**Statement with grounds with regard to novelty, inventive step, and industrial
applicability; documents and explanations supporting such statement**

Reference is made to the following document:

D1: FR-A-1,000,870 (TROUBETZKOY) 18 February 1952 (02/18/1952)

D2: GB 721,365 A (ZAHNRADFABRIK FRIEDRICHSHAFEN) 5 January 1955
(01/05/05)

Document D1 discloses (the references in parentheses refer to this document): A lockup clutch for a hydrodynamic component in the form of a hydrodynamic clutch that is free of a guide wheel, comprising at least one primary wheel (4) and one secondary wheel (6), which form a working chamber that can be filled with an operating; with two inputs (3, 7), a first input (7) that is linked to the secondary wheel (6) and a second input (3) that is linked to the primary wheel (4), whereby the inputs (3, 7) can be optionally linked via a switchable coupling device (11), comprising at least one switchable clutch (11), to an output (8) of the lockup clutch, thereby producing a first or a second power branch; the clutch (11) between the input (3) of the lockup clutch, coupled to the primary wheel (4), and the output (8) of the lockup clutch in order to create the second power branch is free of any rotationally fixed mechanical connection between the primary wheel (4) and the secondary wheel (6); the coupling between the inputs (3, 7) of the lockup clutch and the output (8) of the lockup clutch in the individual power branches is provided with rpm/torque converting devices (7, 10, 3, 9); the first back gear (7 or 3, respectively) and the second back gear (3 or 7, respectively) have a different gear ratio.

The subject of the claim therefore differs from the known lockup clutch in that the gear ratio of the second back gear is characterized in that it is changed by the amount of slip of the hydrodynamic component at desired lockup in comparison to the first back gear and in that the hydrodynamic component, in particular the secondary wheel, is associated with a braking device, which serves for fixing the secondary wheel in place.

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(ANNEX)**

International Application No.
PCT/EP2004/010521

The subject of claim 1 is accordingly novel (PCT Article 33(2)).

The problem that is to be solved by means of the present invention can accordingly be seen in the fact that the switching box is switched without reducing the motor rpm.*

The solution to this problem, proposed in claim 1 of the present application, is based on an inventive step (PCT Article 33(3)) for the following reasons: In the figure in document D1, the gear ratio in the hydrodynamic branch is greater, that is, it gears down. Even in combination with the document D2, the practitioner could not arrive at the solution: a braking device associated with a turbine wheel is not known for hydrodynamic torque converters.

The claims 2 to 16 are dependent on claim 1 and accordingly likewise fulfill the requirements of the PCT in regard to novelty and inventive step.

* The German original appears to have typographical errors. The translation is inferred—Trans. Note.

Patent Claims*

1. A lockup clutch (1) for a hydrodynamic component (2) in the form of a hydrodynamic clutch (3) that is free of a guide wheel, comprising at least one primary wheel (4) and one secondary wheel (5), which define a working chamber (6) that can be filled with operating fluid;
 - 1.1 with two inputs (26, 27) – a first input (26) linked to the secondary wheel (5) and a second input (27) linked to the primary wheel (4) – whereby the inputs (26, 27) can be optionally linked via a switchable coupling device, comprising at least one switchable clutch (18), to an output (28) of the lockup clutch (1), thereby forming a first or a second power branch (32, 33);
 - 1.1** the coupling between the input (27) of the lockup clutch (1) that is coupled to the primary wheel (4) and the output (28) of the lockup clutch (1) in order to create the second power pathway (33) is free of any rotationally fixed mechanical connection between primary wheel (4) and secondary wheel (5);
 - 1.2 the coupling between the inputs (26, 27) of the lockup clutch (1) and the output (30) of the lockup clutch (1) in the individual power branches (31, 33) is provided with rpm/torque converting devices;

characterized by the following features:

the first back gear (7) and the second back gear (8) have a different gear ratio, the gear ratio of the second back gear (8) being characterized in that it is changed by the amount of the slip of the hydrodynamic component at a desired lockup in relation to the first back gear (7);

the hydrodynamic component (2), in particular the secondary wheel (5), is associated with a braking device (22), which serves to fix in place the secondary wheel (5).
2. The lockup clutch (1) according to claim 1, further characterized in that the switchable coupling device comprises a clutch (18) that can be jointly used with both power branches (32, 33), that is, in the connections between the individual inputs (26, 27) and the output of the lockup clutch, or comprises at least one switchable clutch that is associated separately with each power branch (32, 33).

* sic—The handwritten changes are incorporated in the translation—Translator's note.

** sic—Translator's note.

3. The lockup clutch (1) according to claim 1 or 2, further characterized in that the switchable clutch (18) is designed as a positive locking synchronously switchable coupling.
4. The lockup clutch (1) according to claim 3, further characterized in that the switchable clutch (18) is designed as a claw clutch.
5. The lockup clutch (1) according to one of claims 1 to 4, further characterized by the following features:
 - 5.1 the rpm/torque converting devices in the individual power branches (32, 33) each comprise one back gear – a first back gear (7), which is linked to the secondary wheel (5) in a rotationally fixed manner, and a second back gear (8), which is linked to the primary wheel (4) in a rotationally fixed manner;
 - 5.2 arranged between the first and the second back gears (7, 8) is the switchable clutch (18) for selective coupling of the first back gear (7) or of the second back gear (8) to the back-gear shaft (10) coupled to the output (30).
6. The lockup clutch (1) according to claim 5, further characterized in that the first and second back gears (7, 8) are arranged coaxially and parallel to each other.
7. The lockup clutch according to claim 5 or 6, further characterized in that the output of the lockup clutch (1) is formed by the back-gear shaft (10) coupled to the outputs of the first and second back gears.
8. The lockup clutch (1) according to claim 5 or 6, further characterized in that the outputs of the first and second back gears (7, 8) can be coupled via at least one additional third back gear (9) to the output of the lockup clutch (1).

9. The lockup clutch (1) according to claim 8, further characterized in that one additional second switchable clutch (13) is provided, which is associated with the third back gear (9) and selectively links the third back gear (9) to the back-gear shaft (10).
10. The lockup clutch (1) according to one of claims 5 to 9, further characterized in that the individual back gears (7, 8, 9) are each designed as spur gear sets (11, 12, 13).
11. The lockup clutch (1) according to one of claims 8 to 10, further characterized in that a third switchable clutch (24) is provided, which directly links the input of the lockup clutch (1), coupled to the primary wheel, to the output of the lockup clutch, said clutch arranged, for example, between the second (8) and the third back gears (9) and at least selectively linking the second (8) to the third back gear (9) in a rotationally fixed manner or else releasing this connection.

12. The lockup clutch (1) according to one of claims 1 to 13, further characterized in that the switchable clutches (23, 24) are designed as positive locking, synchronously switchable couplings.
13. The lockup clutch (1) according to claim 12, further characterized in that the positive locking clutch is designed as a claw clutch.
14. The lockup clutch (1) according to one of claims 1 to 13, further characterized in that all switchable clutches (18, 23, 24) are designed as force-activated clutches.
15. The lockup clutch (1) according to one of claims 1 to 14, further characterized in that a free wheel (F) is arranged between the secondary wheel (5) and the input (26) of the lockup clutch (1).
16. A subassembly (25)

* sic--Translator's Note

- 16.1 with a hydrodynamic component (2)
- 16.2 with a lockup clutch (1) according to one of claims 1 to 15.